DATA PROCESSING CENTER FOR RADIOSTRON PROJECT

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ABSTRACT. Radioastron is the international project led by the Astro Space Center of Lebedev Phisical Institute. Moscow, Russian Federation. 10 m Space Radio Telescope is the main payload of Spektr-R spacecraft. It's designed by Lavochkin Association of Roscosmos Russia State Agency. The project goal is to create together with a ground based radio telescopes the huge Ground to Space interferometer with a baseline up to 350 km, to obtain images, positions and movements of various objects in the Universe with extremely high angular resolution (about 10e–6 arcsec). After successful launch on 18 July, 2012 the Radioastron missions starts systematic investigations of the Universe at broad radio frequencies range.

DATA PROCESSING CENTER is a fail safe complex centralized system of interconnected software and hardware components, and organizational procedures, which is designed for reliable data storage and processing, delivery of services and applications, and this system possessed a high degree of virtualization of its resources. The main tasks performed by SDPC: effective realization of data acquisition and storage in a specialized data repository for a preset time with given reliability; delivery of applied services to users; and data processing on high performance computer complex.

The complex includes: control unit, computer cluster, data repository with a capacity of 200 TB, backup system on magnetic tapes (200 TB), 24 TB redundant storage system in the Pushchino Radio Astronomy Observatory, Astro Space Center of Lebedev Physical Institute in Pushchino, Web and FTP servers, networks of management and data transmission.

Let us consider each component of the computer complex in more detail.

The cluster (the main component of the complex) is a group of computers connected with high speed communication channels. From the standpoint of users it is an integrated hardware resource. The computer cluster presented in this paper includes one control and ten computing servers assembled in a common rack. Processing power of created computer cluster according to Linpack was found to be equal to 1000 Gflop/s.

The storage system consists of primary storage systems on 200 TB HDD plus 200 TB backup system. The first step for ensuring high availability is to protect the most important part of the system, namely, the data. Storage reliability is achieved by using RAID6 similar to RAID5, but having a higher degree of reliability: 2 disk capacity is allocated for check sums, double sums are calculated using different algorithms. This method suggests the use of disk arrays available to users as a single logical disk. The disk array has additional capacity providing for the ability of restoring the data in case of sudden failures.

In the case of failure of any component of the computer complex or its disconnection, a 24_TB data storage system organized in Pushchino can make backup in order to prevent data losses.

For prompt data exchange with backup data storage unit an independent direct communications channel with 1 GB/s speed was created between the Pushchino Radio Astronomy Observatory of Lebedev Physical Institute and Moscow Astro Space Center.

The information into the Processing Center comes via the Internet. From places, where there are no high speed communication channels, delivery of data on hard disks is possible.

The structure and functions of ASC Data Processing Center are fully adequate to the data processing requirements of the Radioastron Mission and has been successfully confirmed during Fringe Search and Early Science Program in flight operations.

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